

# PATENT SPECIFICATION



Application Date : May 29, 1919, No. 18,595 / 19.

**150,411**

Complete Left : Nov. 25, 1919.

Complete Accepted : Aug. 30, 1920.

## PROVISIONAL SPECIFICATION.

### Improvements in or relating to Apparatus for Launching Aeroplanes from Floating Structures or other Restricted Areas.

We, SIR W. G. ARMSTRONG, WHITWORTH & COMPANY LIMITED, and LOUIS JOHN LE MESURIER, Engineer Lieutenant Commander, R.N., all of Elswick Works, Newcastle-upon-Tyne, Northumberland, do hereby declare the nature of this invention to be as follows:—

This invention relates to apparatus for launching aeroplanes from the decks of barges, ships or like restricted spaces and has for its object to provide an apparatus of simple construction which will obviate the employment of the airtight glands through which it has hitherto been necessary to pass some of the wire ropes.

According to this invention a carriage for the aeroplane is mounted to travel on a track formed on the deck or like structure and a cylinder actuated by the expansion of compressed air is mounted to travel on a second track, parallel to the first track, the carriage being connected by means of a rope to the cylinder in such a way that movement of the latter causes acceleration of the carriage along its track. The carriage is also connected to the cylinder by a second rope in such a manner that a retardation of the carriage takes place after the aeroplane has been released therefrom, ports being so formed in the piston that during the final portion of the cylinder's travel air is compressed therein. The carriage is retained in its initial position by means of a catch or trigger, and the air is then introduced into the cylinder so that the carriage is drawn forward along its track directly the trigger is released without any valve gear or the like being necessary. A cam

or ramp suitably placed on the track or some other part of the main structure automatically releases the aeroplane from its carriage when the maximum speed has been attained.

One form of apparatus according to this invention is described hereafter by way of example.

The aeroplane is placed upon a carriage which is mounted to travel upon a track or rails extending the full length of the deck or other main structure. Formed parallel to and preferably below the main track is a second set of rails, along which a cylinder is adapted to travel relatively to a fixed ram under the expansion of a charge of compressed air. The carriage is connected to the cylinder by a wire rope whose ends are respectively secured to the fore part of the carriage and a fixed portion of the structure, the rope being passed round a pulley on the fore end of the cylinder in such a way that an acceleration twice that of the cylinder is imparted to the carriage. A retarding rope is similarly provided and secured to the carriage and structure but so arranged as to oppose the motion of the accelerating rope.

A trip mechanism is fitted to the travelling carriage actuated by a cam or ramp suitably placed near the track so that the aeroplane is automatically released after it has attained its maximum speed.

The carriage is normally retained in the launching position by means of a suitable catch or lever secured to the rear end of the main structure.

The travelling cylinder is adapted to

[Price 1/-]

reciprocate relatively to a stationary ramp having a hollow shank or rod provided near its forward end with suitable exhaust ports which are uncovered after the cylinder has moved forward a predetermined distance sufficient to impart the necessary launching acceleration to the carriage. For the remainder of its travel the air trapped between the rear end of the cylinder and inner face of the piston is compressed, so retarding the final portion of the cylinders travel, while the charge of compressed air hitherto operating between the face of the piston and closed forward end of the cylinder escapes freely through the open exhaust ports into the atmosphere.

When the aeroplane is to be launched the carriage is anchored to the rear of the track or structure by the retaining lever and the cylinder is charged to the required pressure with compressed air through the charging valve which is then closed. The retaining lever is then released whereupon the cylinder will be driven forward owing to the expansion therein of the compressed air and the carriage will receive twice the amount of acceleration through the acceleration rope.

As the device is self-contained as regards power after being charged with compressed air there will be no losses

due to wire drawing at valves during the acceleration.

When the cylinder has reached its maximum speed the trip mechanism releases the aeroplane from the carriage and the exhaust ports in the hollow shank of the piston are simultaneously uncovered, so that the main charge of compressed air escapes into the atmosphere while the air trapped between the rear end of the cylinder and the inner face of the piston is compressed, thus acting as a retarding buffer. If desired an auxiliary buffer spring may be provided to assist in bringing the empty carriage to rest.

To prepare the device for a further launch the carriage is rolled back to the starting position and held there by the retaining lever while the cylinder is recharged with compressed air.

It will be understood that other suitable means for holding and releasing the travelling cylinder and carriage may be used; as, for example, a release mechanism acting directly upon the cylinder, without departing from this invention.

Dated this 29th day of May, 1919. 85

KILBURN & STRODE,  
Agents for the Applicants.

#### COMPLETE SPECIFICATION.

##### Improvements in or relating to Apparatus for Launching Aeroplanes from Floating Structures or other Restricted Areas.

We, SIR W. G. ARMSTRONG, WHITWORTH & COMPANY LIMITED, and LOUIS JOHN LE MESURIER, Engineer Lieutenant Commander, R.N., all of Elswick Works, Newcastle-upon-Tyne, Northumberland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

This invention relates to apparatus for launching aeroplanes from the decks of barges, ships or like restricted spaces and has for its object to provide an apparatus of simple construction which will obviate the employment of the airtight glands through which it has hitherto been necessary to pass some of the wire ropes.

According to this invention a carriage for the aeroplane is mounted to travel on a track formed on the deck or like structure and a cylinder actuated by the ex-

pansion of compressed air is mounted to travel on a second track, parallel to the first track, the carriage being connected by means of a rope to the cylinder in such a way that movement of the latter causes acceleration of the carriage along its track. The carriage is also connected to the cylinder by a second rope in such a manner that a retardation of the carriage takes place after the aeroplane has been released therefrom, ports being so formed in the piston that during the final portion of the cylinder's travel air is compressed therein. The carriage is retained in its initial position by means of a catch or trigger, and the air is then introduced into the cylinder so that the carriage is drawn forward along its track directly the trigger is released without any valve gear or the like being necessary. A cam or ramp suitably placed on the track or some other part of the main structure

automatically releases the aeroplane from its carriage when the maximum speed has been attained.

One form of apparatus according to this invention is illustrated by way of example in the accompanying drawings, in which,

Figure 1 is a side elevation, and

Figure 2 is a plan on an enlarged scale, partly in section, showing the compressed air cylinder and its ram.

The aeroplane A is placed upon a carriage B which is mounted to travel upon a track or rails B<sup>1</sup> extending the full length of the deck or other main structure. Formed parallel to and preferably below the main track B<sup>1</sup> is a second set of rails C, along which a cylinder D, having wheels D<sup>1</sup>, is adapted to travel relatively to a fixed ram E under the expansion of a charge of compressed air. The carriage B is connected to the cylinder D by a wire rope F whose ends F<sup>1</sup> F<sup>2</sup> are respectively secured to the fore part of the carriage and a fixed portion G of the structure, the rope being passed round a pulley H on the fore end of the cylinder in such a way that an acceleration twice that of the cylinder is imparted to the carriage B. A retarding rope J is similarly provided and secured to the carriage and structure but so arranged as to oppose the motion of the accelerating rope F, the ends of the retarding rope being respectively secured to a fixed portion K of the structure and to the carriage B and passing over a pulley L on the cylinder.

A trip mechanism (not shown) is fitted to the travelling carriage B actuated by a cam or ramp B<sup>2</sup> suitably placed near the track B<sup>1</sup> so that the aeroplane is automatically released after it has attained its maximum speed.

The carriage B is normally retained in the launching position by means of a suitable catch or lever M secured to the rear end of the track B<sup>1</sup>.

The travelling cylinder D is adapted to reciprocate relatively to a stationary ram E having a hollow shank or rod E<sup>1</sup> provided near its forward end with suitable exhaust ports E<sup>2</sup> which are uncovered after the cylinder has moved forward a predetermined distance sufficient to impart the necessary launching acceleration to the carriage. For the remainder of its travel the air trapped between the rear end E<sup>4</sup> of the cylinder and inner face of the piston E<sup>3</sup> is compressed, so retarding the final portion of the cylinder's travel, while the charge of compressed air hitherto operating between the face of the piston

and closed forward end of the cylinder, escapes freely through the open exhaust ports E<sup>2</sup> into the atmosphere.

When the aeroplane is to be launched the carriage is anchored to the rear of the track or structure by the retaining lever M and the cylinder D is charged to the required pressure with compressed air through the charging valve N which is then closed. The retaining lever M is then released, whereupon the cylinder D will be driven forward owing to the expansion therein of the compressed air and the carriage B will receive twice the amount of acceleration through the acceleration rope F.

As the device is self-contained as regards power after being charged with compressed air there will be no losses due to wire drawing at valves during the acceleration.

When the cylinder has reached its maximum speed the trip mechanism releases the aeroplane from the carriage and the exhaust ports E<sup>2</sup> in the hollow shank of the ram E are simultaneously uncovered, so that the main charge of compressed air escapes into the atmosphere while the air trapped between the rear end of the cylinder and inner face of the piston E<sup>3</sup> is compressed, thus acting as a retarding buffer. If desired an auxiliary buffer spring may be provided to assist in bringing the empty carriage to rest.

To prepare the device for a further launch the carriage is rolled back to the starting position and held there by the retaining lever M while the cylinder is re-charged with compressed air.

Although in the above description single acceleration and retarding ropes have been referred to, in practice these may be duplicated and provided on each side of the cylinder, the latter having pulleys on either side for this purpose.

It will be understood that other suitable means for holding and releasing the travelling cylinder and carriage may be used; as, for example, a release mechanism acting directly upon the cylinder, without departing from this invention.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:

1. In apparatus for launching aeroplanes or seaplanes from a ship's deck or like restricted area the combination with a carriage mounted to travel on a track of a cylinder adapted to travel under

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the expansion of a fluid pressure medium on a second track parallel to the carriage track; and a rope connected to the carriage and a fixed part of the structure engaged by a pulley on the travelling cylinder.

2. In apparatus for launching aeroplanes from a ship's deck or like restricted space the combination with a carriage mounted to travel on a track of a cylinder 10 adapted to move relatively to a fixed plunger on a second track parallel to the carriage track, a rope connected to the fore end of the carriage and passed over a pulley on the cylinder whereby the 15 movement of the latter accelerates the

carriage, a second rope whereby the carriage is retarded passing round a second pulley on the cylinder and means for retarding the movement of the cylinder towards the end of its stroke.

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3. The combination and arrangement of parts constituting the complete apparatus for launching aeroplanes from floating structures or like restricted spaces as described or illustrated in the accompanying drawings.

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Dated this 25th day of November, 1919.

KILBURN & STRODE,  
Agents for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]

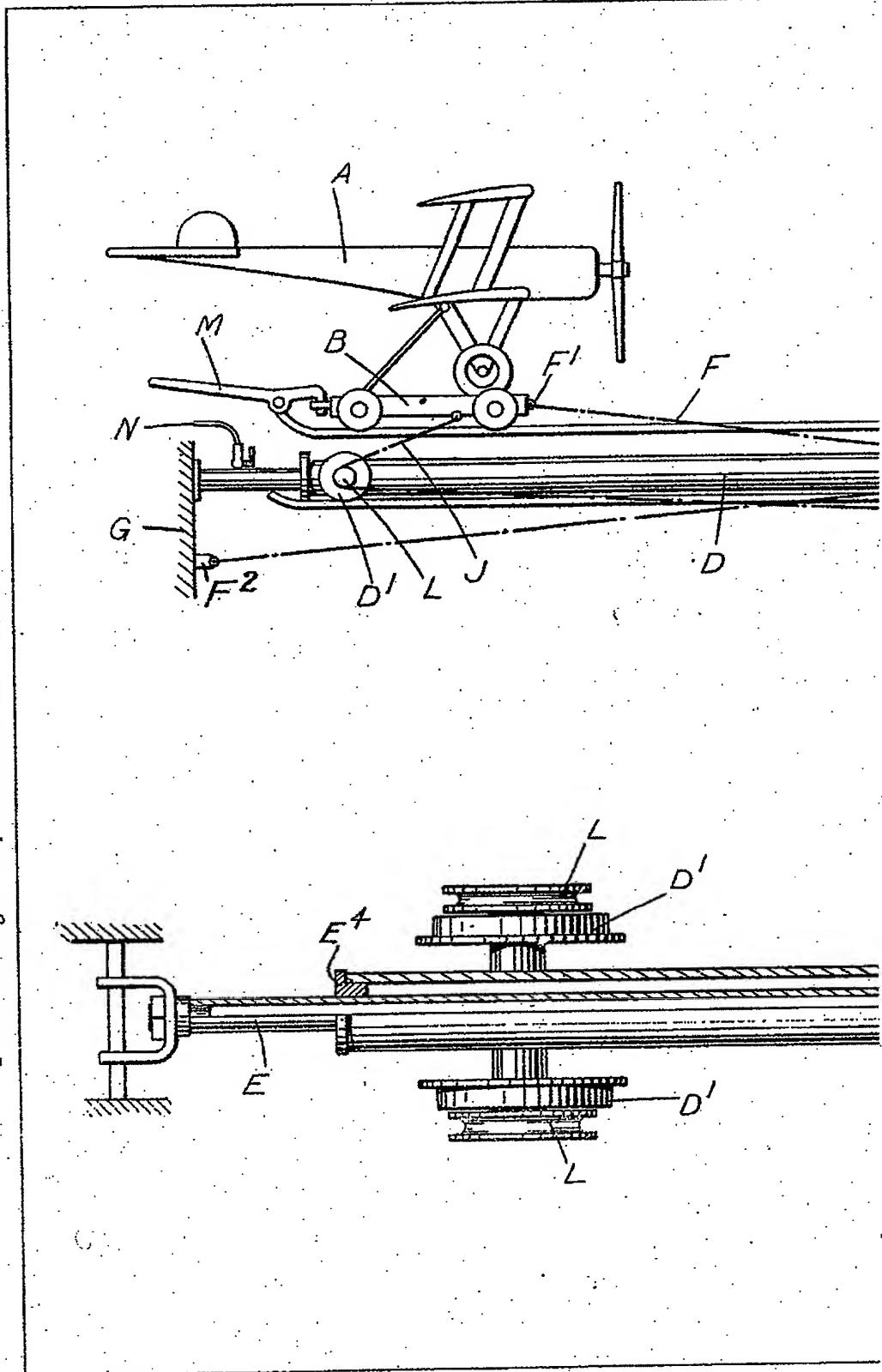


FIG. 1.

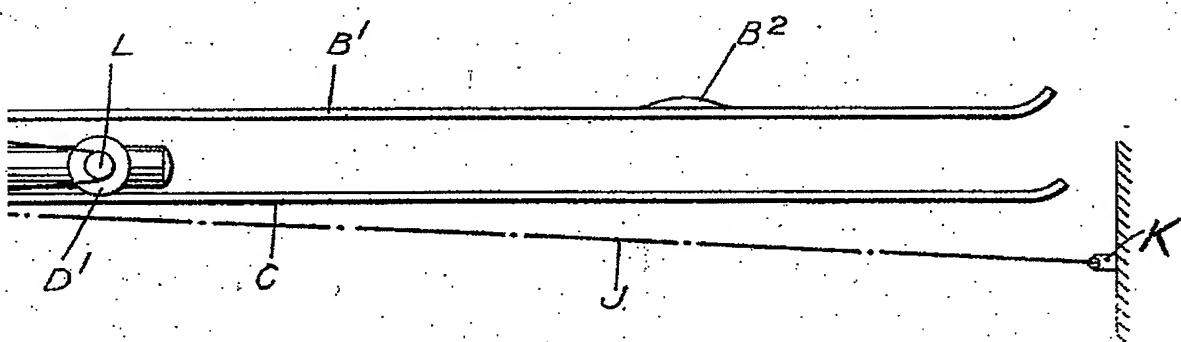
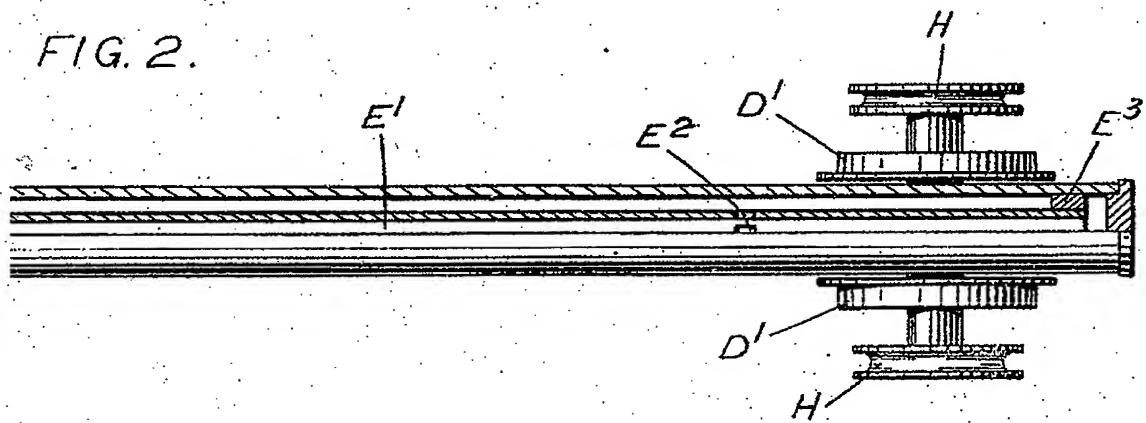


FIG. 2.



*[This Drawing is a reproduction of the Original on a reduced scale.]*

FIG. 1.

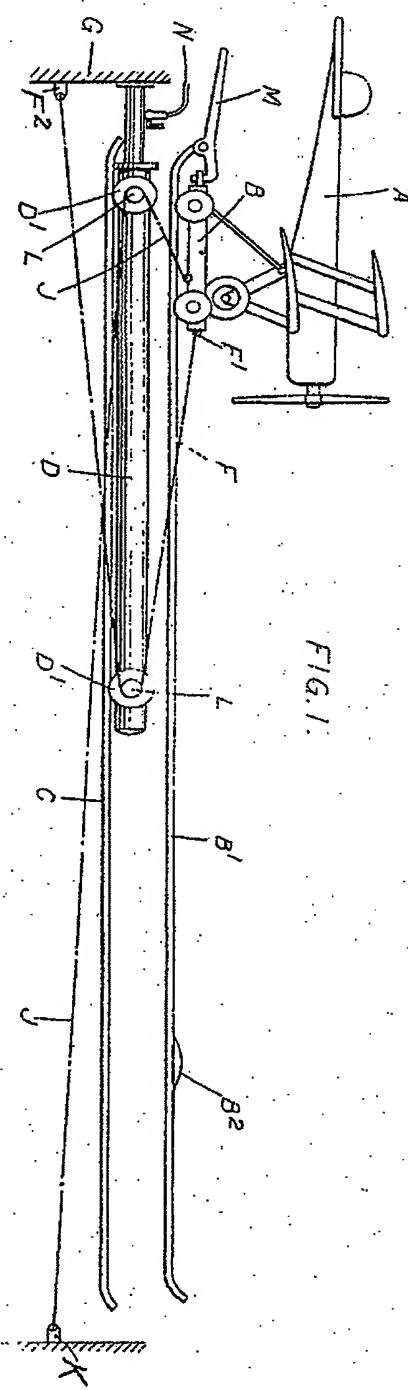
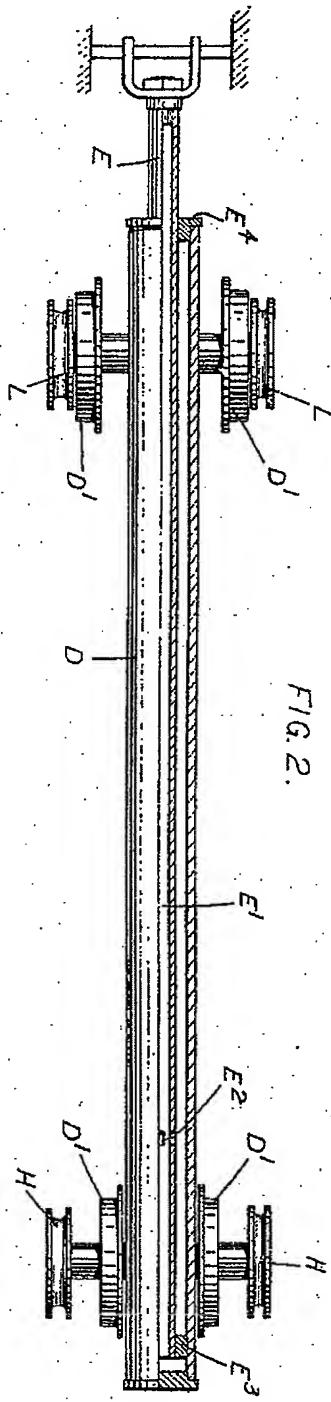
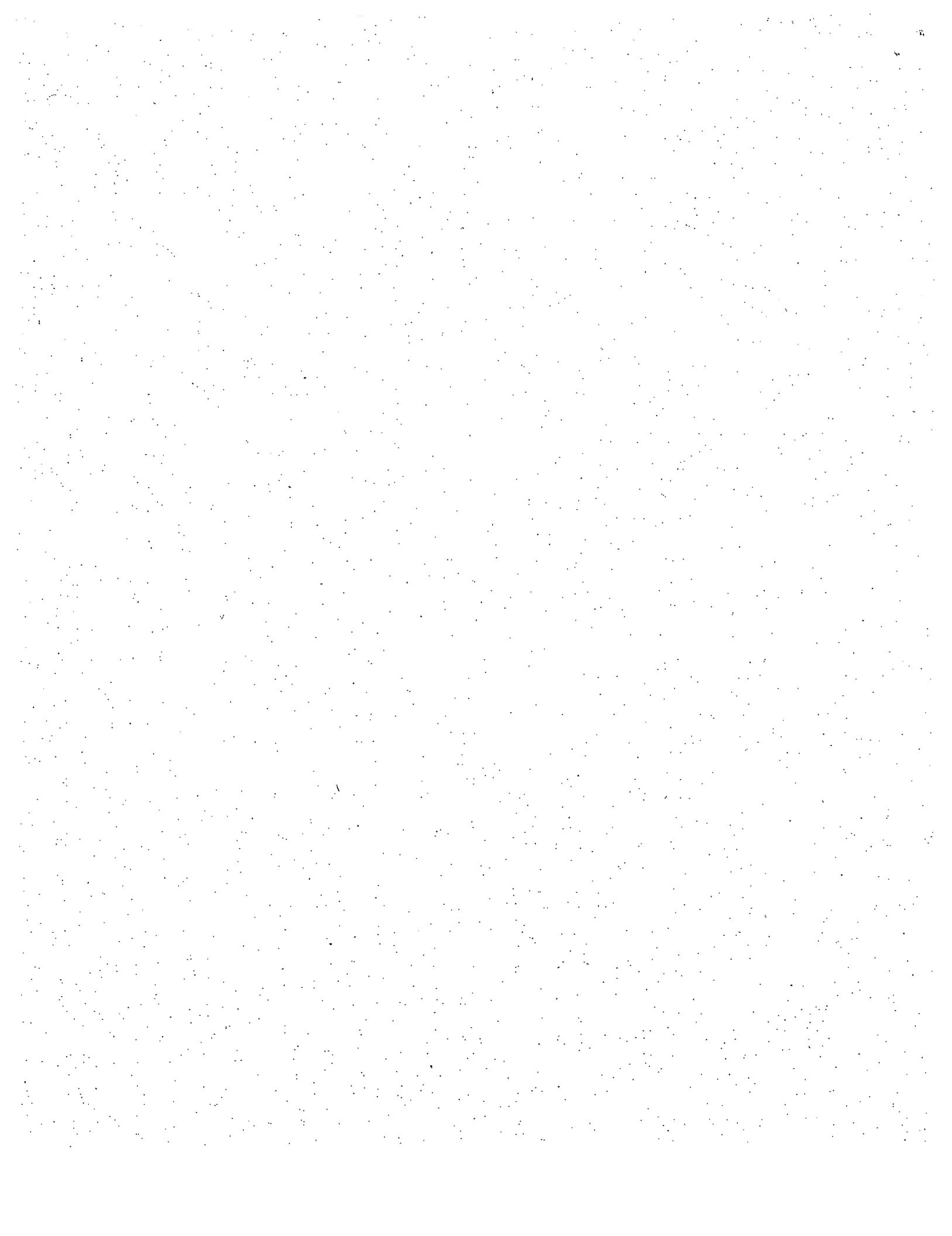


FIG. 2.





This Drawing is a reproduction of the Original on a reduced scale.

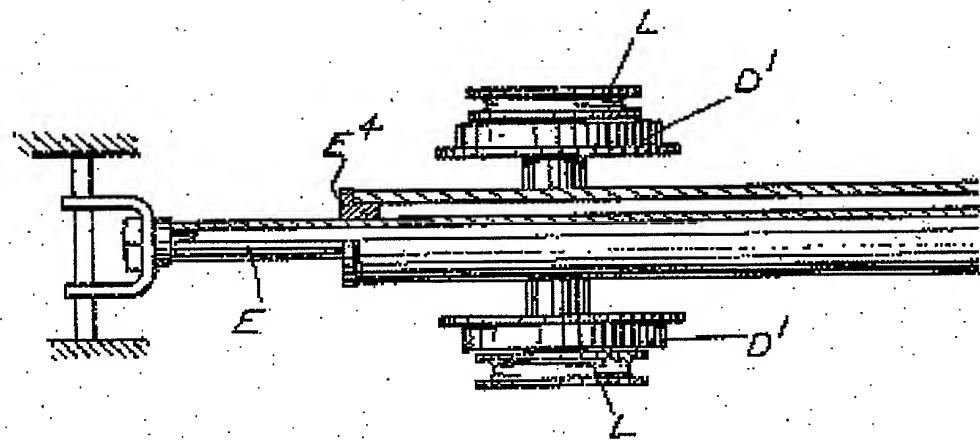
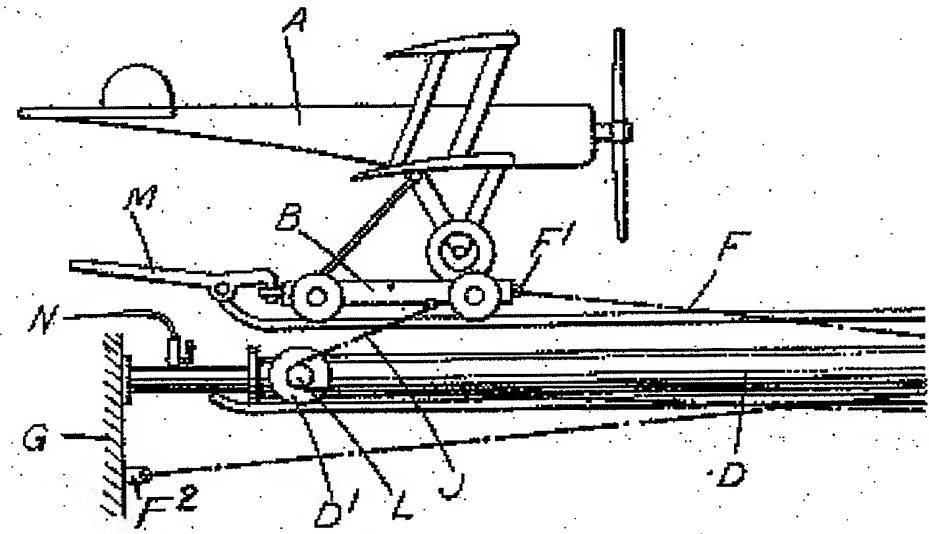


FIG. 1.

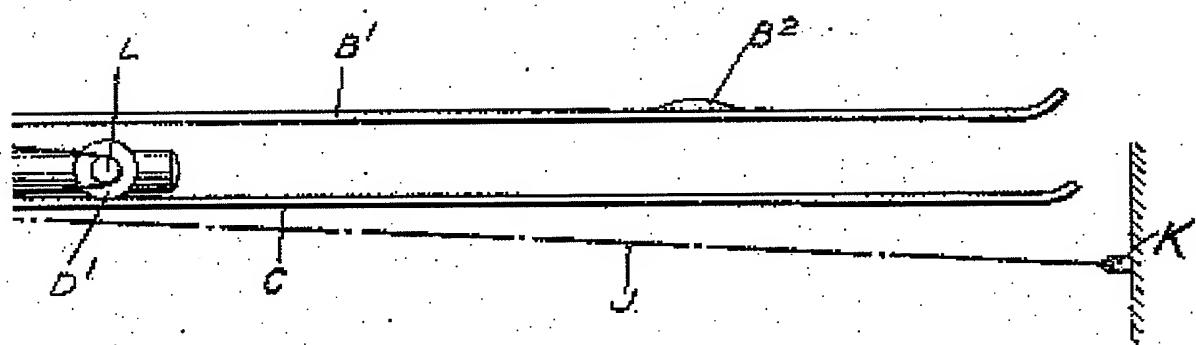
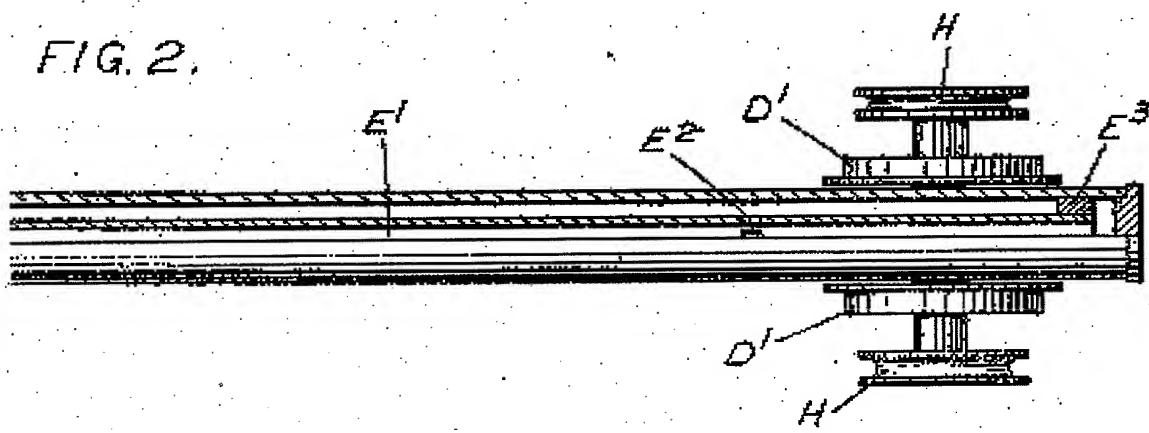


FIG. 2.



This drawing is representative of the composition of certain scales.

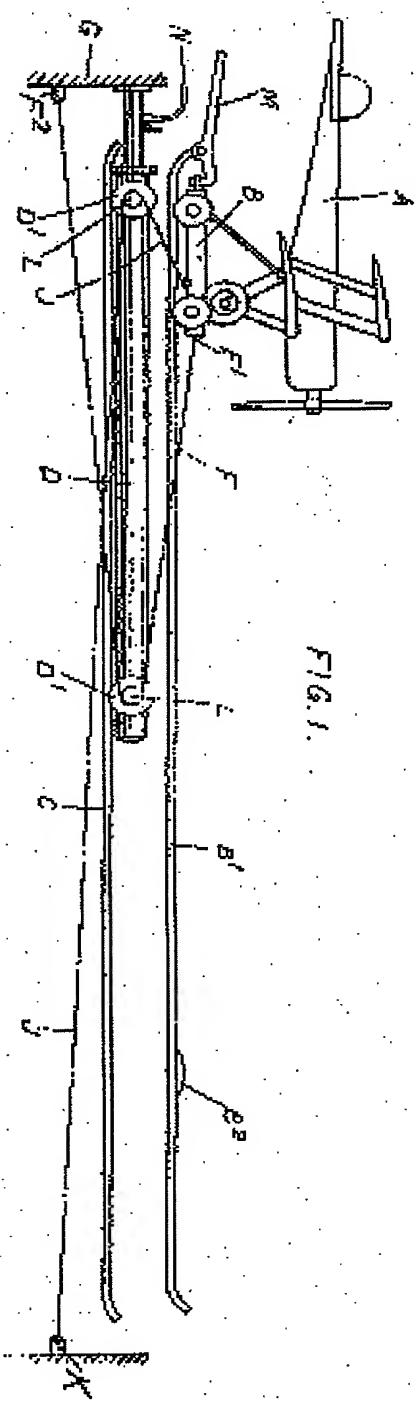


FIG. 1.

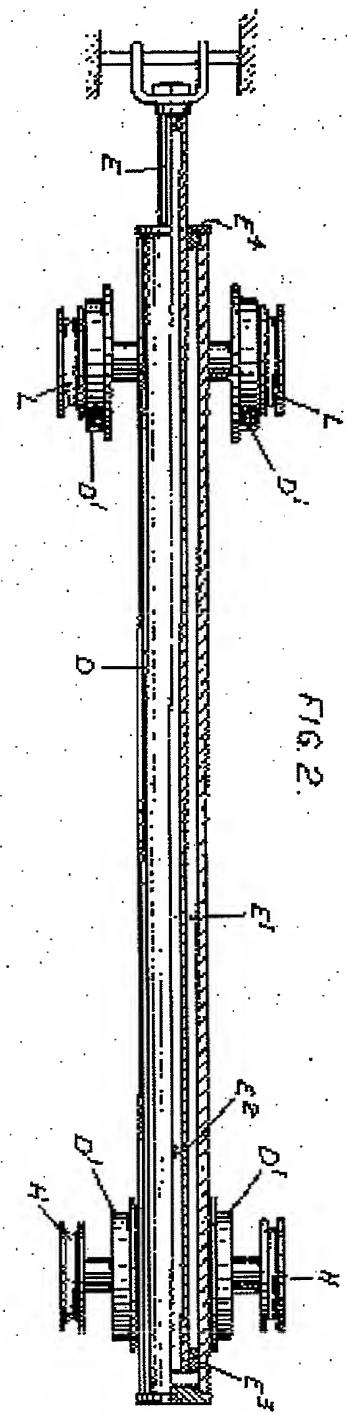


FIG. 2.